The implementation of energy saving policies and their influence on energy use and cultural values in the housing stock of Sweden

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The implementation of energy saving policies and their influence on energy use and cultural values in the housing stock of Sweden

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Abstract. Introduction: The overall objective is to understand how policies may be used to increase the potential for saving energy while simultaneously preserving cultural values in the housing stock. The project contributes to SDGs 11, 17, 5, 8 and 10. Methods: The paper summarises and discusses findings in previous research and projects led by the authors. Finally the design of a new project launched in 2020 is presented. The purpose of *Energy efficiency and cultural values. How well do the policies function on the local level?* is to give valuable knowledge on how the building process, advice on energy use and renovation strategies work together in Swedish municipalities. Results: Since the 1970s there has been a conflict between the preservation of architectural heritage and decreasing energy use in the Swedish housing stock. The first policy programme focussing energy saving was launched after the first global energy crisis in 1973. Since then there have been different policies addressing the issue of energy use in housing. The knowledge of how to carefully renovate existing buildings has increased, but the incentives for cutting energy use further has diminished among property managers. As a consequence, there is very little renovation aiming at energy efficiency, which challenges the national goals of lessening the impact on climate change. One problem may be an incoherent and inefficient implementation of policies dealing with the preservation and the energy use of the built environment. Conclusions: The antagonism between energy efficiency and cultural heritage that emerged in the 1970s has changed in character. Above all, increased energy efficiency seems not to be a very strong force when designing renovation projects in homes. If Agenda 2030 goals of accomplishing a well-built environment that does not require unsustainable practices to be sustained are to be reached, new policies will be required. Grant support: The research has been supported by the Swedish Energy Agency (grant #50041-1).

1. Introduction

Even though energy use is no longer increasing in the Swedish housing stock the Swedish Energy Agency identifies an important challenge in decreasing the level. Housing and services represent almost 40 per cent of total energy use in Sweden [1]. EU directive 2012/27/EU, as well as the national strategy for energy efficient renovation, say that the energy consumption of the existing housing stock has to decrease in order to reach the climate goals of the UN and Paris agreement.

The situation today shows a discrepancy between ambitious goals for energy efficiency in the housing stock and a strikingly slow rate of renovation [2] and in adoption of energy savings measures [3]. The goals for energy efficiency intersect with other important goals for sustainable development of the built environment, notably cultural heritage, urban design and cultural identity [4]. There is an evident risk that these and other goals aiming at limiting the impact of climate change will cause a conflict with the goals of protecting the character of the built environment. Agenda 2030 (an action plan launched by the Swedish government to address the UN Sustainable Development Goals, SDGs) has identified culture as an important driver for sustainable development, referring both to tangible built monuments and intangible heritage in traditions, expressions and practices [5]. In Sweden, one of 16 national environmental objectives [6] focuses a 'good built environment'. It specifies that the cultural, historical and architectural value of buildings should be preserved and developed to the benefit of a sustainable transition of society. The scarcity of older buildings in Sweden should also be regarded in the development of national programmes for energy efficient renovation [7].

The potential to achieve a sustainable built environment is dependent on the design of well-functioning policies such as national and local guidelines that combine goals for reduced use of energy with goals for heritage protection. Experience from earlier energy savings policies have shown that if energy policy is implemented without consideration of the built heritage the consequences can be permanent and negative for the historic environment and for people's possibilities of enjoying beauty and understanding the bonds between themselves and their habitat [8].

As a result of earlier Swedish energy saving programmes some of the character of the older housing stock has been lost due to external insulation of facades and replacement of windows. In future renovation schemes more sustainable strategies need to be sought. Since there is an increasing policy interest today in design, architecture and urban planning [9], [10] there are good reasons for attempting to reach a solution that takes into account both energy use and cultural values. Housing with important cultural values might be particularly difficult to deal with in general energy efficiency policies, because its architecture builds on craftsmanship and materials that may not be commonly used today. Historically policymakers have shunned this potential conflict by means of exclusion or ignorance. However, there is also an important challenge to consider and protect cultural and architectural values in building stocks that are without any formal heritage, and this regards the larger part of the building stock, from alterations that an energy retrofit can bring on.

This paper reports from a recently initiated project that aims at filling a gap by focusing the problems of preserving cultural values and achieving energy efficiency that follow from an incoherent use of policies. In *Energy efficiency and cultural values. How well do the policies function on the local level?* (Swedish Energy Agency, project 50041-1, 2020 - 2023) policy is understood as consisting of laws, regulations, aims and counselling provided and used by national and local government but also internal policies of large real estate companies. In order to understand how policy affects strategies for the renovation of housing stocks it is crucial to recognise that the dynamic of policies on a local level is complex and thus needs to be studied and understood as such. By better understanding how these policies function in municipalities it should be possible to re-design them with the aim of lessening the risk of conflicts between conservation and energy efficiency. The project will study the design and implementation of policies in Sweden in a historical context. The projects builds upon earlier research which have shown that the results of previous renovations and energy savings policies influence contemporary practices [11], [12].

1.1. Aim and approach

In this specific paper, an outline for the new research project is presented by providing a short overview of how energy policies for the housing stock were first articulated and introduced in Sweden, and how they subsequently were shaped and implemented. More specifically, the paper is based on a retrospective analysis of literature studies and a case study of how energy policy was implemented in Gothenburg [12], [13].

Historical studies of how energy policies have developed, not only focusing on the particular effects in economic or energy saving terms, but also analysing discursive and organisational changes, can be useful for future policy making [14]. We therefore set out to trace the historical origins of Swedish policies for energy efficiency in housing, how these were debated and mitigated, and to discuss how values and ideological standpoints constituted in the 1970s affect policy and practice in Sweden today. Our focus is on how heritage conservation has both co-evolved and come into conflicts with energy efficiency policies.

2. The first energy savings plan for existing buildings

The first policy programme focusing energy saving was launched after the energy crisis in 1973. The overarching goal of the programme, which also was reached in a ten-year period, was to make Swedish economy much less dependent on oil. Among the strategies chosen was one aiming at making energy use in buildings more efficient, since buildings consumed roughly 50 per cent of all energy in the nation. The period 1974–84 was a time when a great transition of fuels from oil to district heating and electric heating took place [15]. The transition to electricity eliminated most of the loss of energy that came from using oil for heating single apartment houses. Sweden suddenly "made a striking turn away from oil" from having been one of the most oil dependent countries to becoming one of the *least* dependent countries in Europe [16]. From a point of view of energy use, then, the period from 1970 to 1985 represents a paradigmatic shift in Sweden.

Starting in 1974 the government issued loans and grants to homeowners who wished to make investments in order to improve the energy performance of their property. The idea was to catch an existing demand for renovation and use it to quicken up the pace of introduction of thermal insulation, triple glazing, more efficient heating systems, lower indoor temperature in buildings etc. Some of the consequences of interventions in buildings were replacements of facades or old wooden windows and doors that otherwise could have been conserved [8]. As a result, for the first time in Sweden a conflict between heritage values and energy saving goals was identified [17]. Before the 1970s there was not a clear-cut conflict at a policy level [18].

During the period 1978–88 a total of 40 billion SEK would be spent by the government on thermal insulation, new heating systems, new windows and doors, information to homeowners, etcetera. Local and regional authorities were supposed to cooperate and reach consensus on how to deal with building and planning in a municipality [19], but in reality municipalities seem to have accepted that a quick processing of applications for energy savings loans and grants overrode considerations of environmental or historical values. Only in areas with detailed plans for building, such as in urban areas, did homeowners need to apply for building permits when making substantial changes to the exterior appearance of their houses.

3. Selecting targets for the energy saving programme

A significant share of a nation's building stock is commonly perceived as having heritage values, but only fractions are officially designated as heritage buildings in. Cultural values in the built environment are not seldom seen as barriers to energy efficient renovation, and addressed by exempting designated historic buildings from energy efficiency programmes [20].

Governments have made the built environment a target for policies by surveying, categorising and describing it. In Sweden government authorities employed different techniques to do this. The ways in which the housing stock was categorised reveal how government on both national and local level looked at the potentials of energy savings. The categorisation was also made from different viewpoints in conservation. The national planning authorities used dichotomies such as "modern", "half-modern" and "outdated" to easily divide the stock into neat categories [21]. The planning sector looked on modernity as defined by comfort and hygiene. A large number of "outdated" housing units were demolished in the cities post-1945 in the name of "decontamination" (*sanering*). In order to understand why such radical measures were considered legitimate, it is necessary to briefly explain the prevailing discourse of the built environment in 1970s Sweden. Since the 1960s there had been a

consistent effort of the government to reduce the share of outdated housing. Whole blocks and neighbourhoods of older buildings were demolished in order to make way for modern, hygienic and rationally planned housing. This changed in 1973 when government-funded building of housing more or less stopped. The shortage of modern housing was saturated, and was replaced by refurbishment of existing housing. The beginning in the mid-1970s, there was also a reaction against the wave of modernisation and demolition from the conservation sector and the emerging environmental movement which supported renovation instead of demolition and new construction.

In a similar fashion the national heritage authorities used a chronological perspective categorising buildings into "older" ones, usually ones built before 1940, and "newer" ones in order to make the implementation of heritage policies easier [17]. Building materials and technology used were crucial for the definition of these categories. About 30% of all buildings in Sweden were attributed at least some cultural value, loosely based on an absolute age criteria ("built before 1940") [17]. Considerations of how this substantial share of all buildings were to be protected from changes caused by the wish to insulate and decrease energy use were scarce on the national level. There was no policy in effect that made it possible to protect 30 per cent of all houses.

The number of building surveys carried out in municipalities increased sharply after 1974 when the responsibility for urban planning was decentralised in Sweden. However, still at the end of the decade there was little detailed knowledge on the general constitution of the housing stock. The surveying of housing meant that some buildings erected after 1940 also could be associated with cultural values. [22] This response was founded on the environmental movement that turned against what was seen as the dismantling of community identity and heritage [23].

4. The example of Göteborg

As part of the decentralised responsibility for urban planning, the local authorities were commissioned to set up local energy saving plans for the built environment. Göteborg will here illustrate the implementation of policies. The City of Göteborg delegated the task to develop guidelines for energy renovation to the City Planning Office. Together with the City Museum, they made an inventory of housing that could be subject for energy saving measures, which also defined restrictions for what could be allowed in terms of external measures,

The 1979 plan focused on buildings that had no formal heritage protection or which were not part of any local heritage plan at the time. A limit for heritage values were set to 1930 and accordingly, less restrictions were given to housing built after 1930. An evaluation of the thermal conductivity was made of the buildings as loans was not granted buildings which were evaluated as already having a good thermal performance. At the time of the inventory, many buildings had already been subject to energy renovations. If these then reached the limit for thermal performance, no further loans were permitted. When external changes had already been made, the plan allowed for continued changes if the area or building was of lesser values. At the time, a popular solution was external insulation and the replacement of the original wooden facades with a new maintenance free metal or board facade. In the case that the area or building was regarded as having substantial cultural values, the plan instead encouraged the re-creation of the former façade.

A follow-up inventory of the early local energy plan (carried out 2016 – 2018) gives some insights into the efficiency of the plan [12]. In general, timber constructions hosting working class housing have to a higher extent been subject to external insulation and new facades, and in special those built after 1930. External insulation was more easily attached to timber constructions and brick constructions also had a better thermal performance. There was at time also a broader recognition of heritage values of 19th and early 20th century brick and stone residence. In the case of many stone residence, external insulation and new façade materials were applied only to the inner court-yard facades where it was less visible, although the street facades, in most cases, were partly altered through new windows. One restriction in the plan for areas assessed to have higher cultural values, was that the same façade material should be used after applying external insulation and not divergent materials such as metal or board. This rule seems to have been applied even though exceptions are found. In fact, some buildings have been subject

to external insulation and new façade material even though the intervention was refused in a demand for building permit.

5. Exploration of the Swedish housing stock in the late 1970s

From 1977 to 1982 there was an advisory for issues of energy use in buildings at the National Heritage Board (RAÄ). The reason for this advisory was that RAÄ was supposed to monitor the interests of the cultural heritage sector when policies for energy efficiency in buildings were designed and implemented. RAÄ was an authority traditionally having worked with monitoring monumental heritage and carrying out archaeological excavations. At this time, it was not used to communicating with the planning authorities. RAÄ meant that if thermal insulation could be concentrated to the interiors of buildings, such as the floors and the inside of walls and ceilings, there should be little reason for conflict between energy efficiency goals and historical values. However, due to the unnecessary focus put by the national planning authority on exterior insulation of facades there was a great risk that significant values were spoiled.

The most important work carried out by RAÄ in the field of energy efficiency was to cooperate with a research institute (*Statens institut för byggnadsforskning,* SIB) in a survey of the building stock. An inventory of 3,000 randomly selected houses was carried out in 1977, based on plans, inspections and interviews. The purpose of the inventory was to survey the potential for increased energy efficiency in the built environment. The most important conclusion was that the energy efficiency of older single apartment homes previously had been grossly underestimated when calculating the potential to save energy. Much had already been done to make older houses less energy demanding, and additional measures would probably lead to smaller gains.

It also meant that if older houses were to be made more energy efficient, cultural values would have to be bargained with to a greater extent than first expected. A problem was also that too many single-family houses with relatively good thermal insulation had received grants and loans, bringing down the effects of policies. The costs of improving single family homes was much bigger per unit than larger houses. A conclusion was that policies should focus on multiple apartment buildings with poor insulation, and that the least efficient measures should be left out of the programme.

6. Losses of cultural values due to façade insulation and replaced windows

In 1981 the results of the RAÄ survey was published [17]. The survey was based on a statistically calculated selection of 200 houses included in the SIB survey, both single family homes and apartment buildings, which had received support for making energy efficiency measures. The focus was on exterior features of individual buildings, most predominantly changes of façades, windows, doors, and roofs. The authors argued that cultural values were severely affected by energy efficiency measures supported by government grants and loans.

Partly as a result of these surveys the investments made to save energy shifted much in the following years. Interestingly, in 1984 *Bostadsstyrelsen* (The Board of Housing) still predicted that a lot of improvements would be necessary to carry out, including insulation of façades and new windows. There was no mention that any serious consideration had to be taken regarding the conservation of buildings. On the contrary, the reasons to involve the building committees of municipalities were downplayed. With decreasing energy rates, increased energy efficiency would not be the main target of policies in the built environment the following years. Instead, in 1983 an ambitious home improvement programme (*Renovering Ombyggnad Tillbyggnad,* ROT) was launched in order to boost the building sector and decrease the level of unemployment among construction workers and craftsmen [24]. Aims of energy efficiency were now incorporated into this programme.

7. Final discussion

7.1 Conclusions from the findings

In this paper, a summary of experiences from the first energy saving programme has been presented. The experiences will be used as starting points for a new upstarting research project in which knowledge for the definition and implementation of more efficient policy bridging the fields of energy savings, cultural heritage and well-built environment will be developed.

The early energy saving programme is generally remembered as having resulted in inefficient energy measures and a negative impact on architecture and heritage. However, there might be differences between different cities and even within the same city, depending on how policy has been implemented. There also seems as if actors that were involved in these programmes learned over time, and that the energy retrofits became more efficient with time.

One striking experience is that mistakes have been repeated over time. Already during the first year of the energy saving programme, crucial knowledge about the building stock and how energy savings could be reached were made. When ROT was launched these experiences did not seem to be considered. Although knowledge, guidelines and routines for avoiding negative impact on original architecture and cultural heritage had been developed and set in place, once again changes of facades, additions of external insulation and replacement of windows were allowed which significantly altered the character of the addressed buildings. One reason for this is the persistent weak position of heritage protection in the legal system.

A positive legacy of the early energy programmes is that an empirically based knowledge of the building stock, its characteristics and status, was begun to be accumulated. However, the current situation is still that research focussing technical aspects and energy efficiency are most often separated from research and debate on architectural quality, liveable cities and cultural heritage. In most recent years the social implications of energy renovation has emerged as an additional topic that largely sets the agenda for housing renovation and which should be considered in future policy design [3].

Finally, the antagonism between energy efficiency and cultural heritage that emerged in the 1970s has changed in character. We will not face a new trend in modernising the housing stock with vast government subsidies in the near future. National government is not expected to launch another programme of the same dimensions as they energy savings programme of the 1970s. History does not repeat itself. The way energy efficiency is integrated in the renovation of housing today seems more complex than it was 40 years ago. Above all, increased energy efficiency seems not to be a very strong force when designing renovation projects in homes [3]. ROT is still an active policy meant to keep the level of employment in the building sector up, but it is market-oriented in a way that the energy saving programme was not and it is only available for home-owners, and not owners of rental property. Its design can hardly be said to promote sustainable development or mitigate the impact of building on climate change. Other forces such as increased living space or comfort seem to be much more important forces keeping the frequency of renovation up. If Agenda 2030 goals of accomplishing a well-built environment that does not require unsustainable practices to be sustained are to be reached, new policies will be required.

7.2 Continued research

In this project, the historic challenge of making the housing stock more energy efficient will be explored as well as the contemporary challenges of how well policies are actually functioning today. In this paper some conclusions from Göteborg have been made. The aim of the new project is to understand how energy policy is implemented on a local level in a number of municipalities (Visby, Gävle, Stockholm and Göteborg), and how these processes affect architecture and cultural values when decisions are made regarding renovation of housing. A sub-focus will be on understanding the legacy of earlier energy saving policy and the results of these will affect decisions taken today. One important research question is what factors influence the balance between energy efficiency and preservation of heritage values in decision-making. Questions of how we should go about saving energy are complex and embedded in social practices.

The project furthermore aims at contributing to more efficient design and implementation of existing policy in energy efficiency and heritage protection. We wish to improve the ambitions for

energy savings in renovation of culturally valuable housing stocks, which include both older and younger housing stock. This will be achieved by carrying out a combination of historical studies and social studies of current practice. In recent years there has been a more nuanced discussion in both academia and among heritage professionals on how to balance energy efficiency and conservation. It has been emphasised that policymaking should be based on a refined understanding of how decisions on energy efficiency interventions actually are made and how they relate to everyday practices [25]. This requires interdisciplinary research with contributions from the humanities as well as social sciences [26].

Finally the project will engage in action research in order to initiate changes in current policy implementation. This will be done through workshops with civil servants, property owners, and consultants. We thus aim at contributing to international policy agendas that emphasise culture as a vehicle for sustainable development, as described in the Agenda 2030 [5], and in current Swedish policy for liveable cities [10]. This perspective connects the project to the SGD 11, but we also aim at contributing to SGD 17 by bringing local communities together and revitalise partnerships; SDG 5 in the understanding of how different communities value cultural expressions; SDG 10 by strengthening trade in cultural goods and services; and SDG 8 by supporting the protection of cultural identity which has the potential of contributing to local business and tourism.

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